

WHAT IS CLAIMED IS:

1. Cluster management software comprising:  
a plurality of cluster agents, each cluster agent associated with an HPC node including an integrated  
5 fabric and the cluster agent operable to determine a status of the associated HPC node; and  
a cluster management engine communicably coupled with the plurality of the HPC nodes and operable to execute an HPC job using a dynamically allocated subset  
10 of the plurality of HPC nodes based on the determined status of the plurality of HPC nodes.
2. The cluster management software of Claim 1, the cluster management engine further operable to determine a  
15 topology of the plurality of nodes based, at least in part, on the determined status of the HPC nodes.
3. The cluster management software of Claim 2, the topology comprising a three dimensional Torus.  
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4. The cluster management software of Claim 1, the cluster management engine further operable to dynamically allocate a virtual cluster in the plurality of HPC nodes, the dynamically allocated subset for executing the HPC  
25 job comprising at least a subset of the virtual cluster.

5. The cluster management software of Claim 4, the cluster management engine further operable to:

dynamically allocate a second subset of HPC nodes in the virtual cluster; and

5 execute a second HPC job using the second subset.

6. The cluster management software of Claim 4, the virtual cluster associated with a user group.

10 7. The cluster management software of Claim 6, the cluster management engine further operable to verify a user submitting the HPC job based, at least in part, on the user group.

15 8. The cluster management software of Claim 4, the cluster management engine further operable to dynamically allocate a second virtual cluster in the plurality of HPC nodes.

20 9. The cluster management software of Claim 8, the second virtual cluster comprising different HPC nodes from the first virtual cluster.

10. The cluster management software of Claim 1, wherein the cluster management engine operable to execute the HPC job using the dynamically allocated subset comprises the cluster management engine operable to:

5       receive a job request comprising at least one job parameter;

          determine dimensions of the HPC job based, at least in part, on the one or more job parameters;

          dynamically allocate the subset of the plurality of  
10 HPC nodes based, at least in part, on the determined dimensions; and

          execute the HPC job using the dynamically allocated subset.

15       11. The cluster management software of Claim 10, the cluster management engine further operable to:

          select a policy based on the job request; and

          dynamically determine the dimensions of the HPC job further based on the selected policy.

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12. A method for managing clusters comprising:  
determining a status of a subset of a plurality of  
HPC nodes, each node comprising an integrated fabric; and  
executing an HPC job using a dynamically allocated  
5 subset of the plurality of HPC nodes, the subset  
allocated based on the determined status.

13. The method of Claim 12, further comprising  
determining a topology of the plurality of nodes based,  
10 at least in part, on the determined status from the HPC  
nodes.

14. The method of Claim 13, the topology comprising  
a three dimensional Torus.  
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15. The method of Claim 12, further comprising  
dynamically allocating a virtual cluster in the plurality  
of HPC nodes, the dynamically allocated subset for  
executing the HPC job comprising at least a subset of the  
20 virtual cluster.

16. The method of Claim 15, further comprising:  
dynamically allocating a second subset of HPC nodes  
in the virtual cluster; and  
25 executing a second HPC job using the second subset.

17. The method of Claim 15, the virtual cluster  
associated with a user group.

18. The method of Claim 17, further comprising verifying a user submitting the HPC job based, at least in part, on the user group.

5        19. The method of Claim 15, further comprising dynamically allocating a second virtual cluster in the plurality of HPC nodes.

20. The method of Claim 19, the second virtual  
10 cluster comprising different HPC nodes from the first virtual cluster.

21. The method of Claim 12, wherein executing the HPC job using the dynamically allocated subset comprises:  
15        receiving a job request comprising at least one job parameter;

         determining dimensions of the HPC job based, at least in part, on the one or more job parameters;

         dynamically allocating the subset of the plurality  
20 of HPC nodes based, at least in part, on the determined dimensions; and

         executing the HPC job using the dynamically allocated subset.

25        22. The method of Claim 21, further comprising:  
         selecting a policy based on the job request; and  
         dynamically determining the dimensions of the HPC job further based on the selected policy.

23. A cluster management system comprising:

a plurality of HPC nodes, each node including an integrated fabric and operable to communicate a status; and

5 a management node communicably coupled with the plurality of the HPC nodes and operable to execute an HPC job using a dynamically allocated subset of the plurality of HPC nodes.

10 24. The system of Claim 23, the management node further operable to determine a topology of the plurality of nodes based, at least in part, on receiving the determined status from the HPC nodes.

15 25. The system of Claim 24, the topology comprising a three dimensional Torus.

26. The system of Claim 23, the management node further operable to dynamically allocate a virtual  
20 cluster in the plurality of HPC nodes, the dynamically allocated subset for executing the HPC job comprising at least a subset of the virtual cluster.

27. The system of Claim 26, the management node  
25 further operable to:

dynamically allocate a second subset of HPC nodes in the virtual cluster; and

execute a second HPC job using the second subset.

30 28. The system of Claim 26, the virtual cluster associated with a user group.

29. The system of Claim 28, the management node further operable to verify a user submitting the HPC job based, at least in part, on the user group.

5        30. The system of Claim 26, the management node further operable to dynamically allocate a second virtual cluster in the plurality of HPC nodes.

10       31. The system of Claim 30, the second virtual cluster comprising different HPC nodes from the first virtual cluster.

15       32. The system of Claim 23, wherein the management node operable to execute the HPC job using the dynamically allocated subset comprises the management node operable to:

receive a job request comprising at least one job parameter;

20       determine dimensions of the HPC job based, at least in part, on the one or more job parameters;

dynamically allocate the subset of the plurality of HPC nodes based, at least in part, on the determined dimensions; and

25       execute the HPC job using the dynamically allocated subset.

33. The system of Claim 32, the management node further operable to:

select a policy based on the job request; and

30       dynamically determine the dimensions of the HPC job further based on the selected policy.